EMISSION SPECTRA FROM Cs-He EXCIPLEXES IN A COLD HELIUM GAS

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We have observed the broadband emission spectra over the range of 9500 $\mathrm{cm}^{-1} \sim 11750\ \mathrm{cm}^{-1}$ from $\mathrm{Cs}^*\mathrm{He}_n$ ($n = 1, 2$) exciplexes in a cold helium gas (1.3 K $\sim$ 100 K). The profile of the emission spectra drastically changes with varying the temperature and the helium gas density, which is due to the change of the relative population of vibrational states of $\mathrm{Cs}^*\mathrm{He}$ excimers. The D_2 excitation ($6\ ^2S_{1/2} \rightarrow 6\ ^2P_{3/2}$) leads to clear multi-component broadband florescence from $\mathrm{Cs}^*\mathrm{He}(A\ ^2\Pi_{1/2}, A\ ^2\Pi_{3/2})$ and $\mathrm{Cs}^*\mathrm{He}_2$. The D_1 excitation ($6\ ^2S_{1/2} \rightarrow 6\ ^2P_{1/2}$) leads to very weak broadband fluorescence from $\mathrm{Cs}^*\mathrm{He}(A\ ^2\Pi_{1/2})$. The weakness in the case of the D_1 excitation comes from the potential barrier of the $A\ ^2\Pi_{1/2}$ state of $\mathrm{Cs}^*\mathrm{He}$. We will discuss the assignment of the spectral components, the population distribution of the vibrational states of $\mathrm{Cs}^*\mathrm{He}$, and the predissociation rate of the $A\ ^2\Pi_{1/2}$ state, and will compare the obtained results with the theoretical calculation using the Cs-He interatomic potentials of Ref. [J. Pascale, Phys. Rev. A **28**, 632 (1983)] incorporated with the spin-orbit interaction.